

Environmentally Friendly Educational Innovation Tool to Recognize Numbers from Inorganic Wastes

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ABSTRACT

Inorganic waste is a significant environmental problem due to population growth and rapid industrial development, so there is a need for effective solutions to manage it. One way is to recycle them into useful items in the form of educational teaching aids (APE). APE provides practical solutions to improve the quality of children's education. This program aims to overcome environmental problems and educate the public about the importance of the 3R principle (Reduce, Reuse, Recycle). Apart from that, it is also to increase the creativity of teachers and students in making educational teaching aids (APE) to support educational facilities and infrastructure, as well as creating interactive and fun learning. The method of implementing this service uses an active participatory approach with a social community approach which includes socialization of activities, trials of making APE, training for teachers, mentoring and monitoring, application of tools in the student learning process, and evaluation of activities. The results show that the partners succeeded in creating APE innovations from inorganic waste, were able to operate and apply APE in learning, so that it had a positive impact on children's cognitive and motor development, as well as making it easier for children to recognize numbers.

Keywords: Early Childhood Education, Educational Teaching Aids, Inorganic Waste, Recycling.



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INTRODUCTION

Recycling inorganic waste is an important solution in facing increasingly complex environmental problems. Damayanti (2020) and (Prajati, Padi, & Rahardyan, 2015) argue that the growth rate of industrialization causes an increase in waste generation. Another factor that influences the amount and sources of inorganic waste generation is population. In Lumajang City, population growth is quite high, the higher the level of public consumption and this can cause a lot of waste and rubbish to be found in the surrounding environment (Marliani, 2015). Reporting from the Lumajang Regency Environmental Service, the latest data on waste generation reached a waste weight of 501,547 kg/day. This is not an ordinary problem, as a student who is critical and responsive to the

needs of society, it is his obligation to care about nature, namely recycling inorganic waste into useful products because remembering that this type of inorganic waste is difficult to decompose in nature (Ridwan & Mantja, 2016).

Seeing that in Lumajang Regency the quality of early childhood education is still low due to a lack of physical facilities and infrastructure so that learning media is still held classically and tends to force children to learn, write and calculate, giving rise to the idea of trying to make a new breakthrough by utilizing waste from inorganic waste. To become a teaching aid for early childhood education which can be used as an APE (Educative game tool) in recognizing and adding numbers. One of the important components in children's play activities is APE (Educative Game Tools) (Sumaryanti, Syam, & Wulansari, 2021) because it is useful for stimulating various aspects of children's development in the learning process and developing fine motor skills in early childhood (Astini, Rachmayani, & Suarta, 2017), activates all five senses simultaneously (Adiarti, 2009), and increase children's interest in play activities (Badru & Eliyawati, 2010), and increase children's enthusiasm and creativity (Pusari, 2016).

Although various service programs have been carried out in managing inorganic waste and making educational game equipment (APE), this program offers an innovative approach that has not been widely implemented, namely integrating the concept of recycling inorganic waste with the specific needs of early childhood education in family planning. National Heritage which is located at Clarak Hamlet, Jalan Pasar Animal RT 18 RW 02, Kebonan Village, Klakah District, Lumajang Regency. Previously, inorganic waste processing generally focused on environmental or economic aspects, while this program combines aspects of education, the environment and children's creativity through the use of participatory methods that focus on the active involvement of teachers in the training and production process of APE, which is expected to continue continuously. independently after the program ends with the program's aim being to process inorganic waste into useful items in the form of number recognition tools, support facilities and infrastructure for the teaching and learning process of early childhood, increase children's creativity, and create interactive learning.

METHODS

The implementation of PKM-PM is carried out using a participatory method with a social community approach (Nurhikmawati & Yuhanna, 2020) namely emphasizing the active role and influence of society in acting and making decisions in everyday life. The first stage in this method is socialization, where the team provides a general overview of the idea, background, goals and benefits of the activity to partners. Next, the team carried out trials in making educational teaching aids (APE) by designing designs that suited the partners' needs, discussing materials and how to use them, and carrying out evaluations to ensure the functionality of the tools. After the trial, the first Training of Trainers (ToT) was carried out which involved direct training for teachers in making APE. The second Training of Trainers (ToT) was then held to deepen teachers' knowledge and skills in creating and perfecting APE. After that, assistance and monitoring to partners is carried out consistently to ensure the process of making and using APE runs well, providing technical support, and improving the quality of the tools made while assessing partners' progress in making APE and the success of the activity. The teaching aids that have been created are then applied in the teaching and learning process to determine their effectiveness in improving student understanding. The final stage is the evaluation of activities, where the entire program is assessed, and interviews with teachers are conducted to determine their understanding and the impact of the program in the future.

RESULTS AND DISCUSSION

Community service activities have been carried out at KB. Pusaka Bangsa whose address is Clarak Hamlet, Jalan Pasar Animal RT 18 RW 02, Kebonan Village, Klakah District, Lumajang Regency for approximately 3 months, starting from 7 May – 1 August 2024.

The first step taken by the PKM-PM team was to conduct an initial location survey at KB Pusaka Bangsa. The survey results show several main problems faced by partners, including limited access to information, books and educational games, as well as inadequate facilities and infrastructure. The team formulated an alternative solution which was communicated with partners, namely making APE from inorganic waste as a way to overcome limited educational resources. This communication process also includes licensing and approval for the continuation of community service programs. The response from partners was very good and fully supported the positive activities. This support includes approval of the use of school facilities for training, as well as active participation from teachers.



Figure 1. Socialization of Activities

Socialization of activities will be carried out on May 7 2024 at KB. Pusaka Bangsa and attended by partner teachers. In this event the team presented the program that would be implemented, the background, objectives and benefits of the activities and discussed the schedule for implementing the activities that would be carried out over 4 consecutive months with partners. Openly, the teacher actively provides suggestions and input in communicating each stage of the activity. They also provide ideas that support planning tools according to school needs. The second stage carried out by the PKM-PM team was the practice of trialling tool making with partners during two consecutive training sessions.



Figure 2. APE Manufacturing Trial

The next activity was a trial of making Educational Game Tools (APE) by the PKM-PM Team which was carried out for two consecutive weeks, namely the first week, 2 - 5 June 2024 by making tools per type, namely Number Sequencing, Number Learning, and Number Addition Games. At the start of the experiment, the team underwent a revision of the design of the tool because the materials used were not suitable, which affected its functionality. But after that we succeeded in making three types

of suitable tools. In the second week, 12 – 19 June 2014, the PKM-PM team made a number recognition tool as well as the finishing stage to ensure the tools, materials and techniques used were correct. So during the testing process, the team succeeded in making six tools consisting of three types.



Figure 3. Documentation of Training of Trainers

The next stage is training for partners which is carried out twice, namely Training of Trainer 1 (ToT 1) on 20 June 2024 and Training of Trainer 2 (ToT 2) on 27 June 2024. Their activities during the training are shown in Figure 3.

The results of the first and second training were that the partner teachers understood the basic concepts and functions of APE, followed by deepening their skills in using educational game tools in the second training session. Teachers are also educated on how to integrate tools into daily learning activities. These two training sessions were very satisfying and showed a significant increase in understanding and skills in using tools which is expected to improve the quality of learning and have a positive impact on the cognitive and motor development of the children involved in this program (Adiarti, 2009).



Figure 4. Documentation of Tool Implementation Activities

The activity of applying number recognition tools in the teaching and learning process for early childhood will be held on August 1 2024 at KB. Pusaka Bangsa Figure 4 shows the class atmosphere and students' enthusiasm in using educational teaching aids that help them recognize and understand the concept of numbers by learning while playing. This shows that the use of Educational Game Tools (APE) in learning is very effective in increasing student interest and involvement. It is also easier for teachers to provide guidance by showing how to use tools effectively, so that the learning process becomes more interesting and memorable for students. This activity marks the direct

application of the results of the service program, where the tools that have been created are used to improve the quality of learning at KB Pusaka Bangsa.

The closing activity in the form of an evaluation with partners was carried out on the same day, showing the results that this program had achieved its objectives. Teachers provide positive feedback regarding increasing children's activity and enthusiasm during the learning process by using educational teaching aids (APE). They also appreciate and participate in the training that has been provided. Apart from that, the number recognition tool that has been created has succeeded in attracting children's attention with its colorful and interactive design, thereby attracting their attention to learning while playing (Angraini & Batubara, 2021). This also improves their numerical skills through fun activities. The corrections and considerations regarding the tools created include two important aspects, namely durability and accessibility. First, the durability of the tool needs to be increased by using stronger and more durable materials. This is important to avoid rapid damage due to repeated use, especially because this tool will be frequently used by children who tend to be active. Second, the size and accessibility of the tool also need to be considered because it affects effectiveness in learning. Therefore, tool design must be further adapted so that educational game tools are more effective in increasing student interaction and learning.

Overall, this activity has been successfully implemented and shows that students, teachers and the surrounding community have responded well, and provide positive indications for the continuation of the program. The knowledge and skills that teachers have acquired can continue to be applied and developed in daily activities, and create a sustainable effect that strengthens the quality of education. With this, it is hoped that the program can be replicated, expand its scope, and ensure that the positive benefits that have been experienced continue but expand in the future.

Indicators of competency achievement are a description of basic competencies, namely in the form of behavior that can be measured or observed to see the achievement of basic competencies which become a reference for assessing learning (Mauliandri, Maimunah, & Roza, 2021). In this case training and application of tools to partners or targets. General achievements can be seen from the family planning teachers. KB. Pusaka Bangsa is active in participating in all series of programs. So the enthusiasm and full enthusiasm proves that the high level of awareness and concern of teachers is in efforts to reduce inorganic waste by applying the principles of recycling so that it becomes useful items and can support the teaching and learning infrastructure for early childhood children in KB. Pusaka Bangsa. The next effort is that the PKM-PM team will continue to provide assistance, monitoring and evaluation over the next 4 months so that the commitment to continue activities in the future can be realized.

CONCLUSION

The conclusion of the Community Service Student Creativity Program (PKM-PM) is that inorganic waste can be recycled into useful items, such as tools for recognizing numbers. This innovation not only helps overcome environmental problems by reducing the amount of inorganic waste in Lumajang Regency, but also meets community needs by creating tools to support the learning process for KB. Pusaka Bangsa students in counting and recognizing numbers. In this way, young children can be more enthusiastic and involved in interactive learning methods. Suggestions for further activities are to continue to focus on processing inorganic waste into useful items and developing number recognition tools that are more varied and interesting for young children. Collaboration with the private sector for funding can be the best solution so that the benefits of this activity can be felt more widely, and can increase the effectiveness of learning methods in all fields of education.

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